CLAIMS

1. A tuning circuit for enabling the excitation of a flexible structure at its resonant frequency, comprising a strain rate sensor configured for attachment to the flexible structure and capable of producing a feedback signal in response to the excitation of the flexible structure, a tuning algorithm capable of converting the feedback signal to a desired periodic waveform, and a first actuator capable of receiving the converted waveform and configured for exciting an oscillatory vibration of the flexible structure.

2. A tuning circuit according to claim 1, further comprising an amplifier capable of amplifying the desired periodic waveform.

3. A tuning circuit according to claim 2, further comprising a filter capable of removing steady state drift from the feedback signal.

4. A tuning circuit according to claim 3, further comprising a capacitor configured for and capable of removing high frequency noise from the feedback signal.

5. A tuning circuit according to claim 4, wherein the desired periodic waveform is a square wave.

6. A tuning circuit according to claim 5, further comprising a second actuator configured so as to provide vibratory input to the flexible structure along an axis different from the oscillatory vibration excited by the first actuator.

7. A tuning circuit according to claim 6, wherein the vibratory input provided by the second actuator to the flexible structure differs in phase and amplitude from the oscillatory vibration excited by the first actuator.

8. A tuning circuit according to claim 4, further comprising a second actuator configured so as to provide vibratory input to the flexible structure along an axis different from the oscillatory vibration excited by the first actuator.

9. A tuning circuit according to claim 8, wherein the vibratory input provided by the second actuator to the flexible structure differs in phase and amplitude from the oscillatory vibration excited by the first actuator.

10. A tuning circuit according to claim 9, wherein the desired periodic waveform is a square wave.

11. A tuning circuit according to claim 9, wherein the desired periodic waveform is a sine wave.

12. A tuning circuit according to claim 9, wherein the desired periodic waveform is a sawtooth.

13. A tuning circuit according to claim 9, wherein the desired periodic waveform is a ramp.

14. A method for maximizing the vibrational amplitude of a flexible structure, comprising the steps of exciting vibration of a flexible structure instrumented with a strain rate sensor capable of producing a feedback signal in response to the vibration of the flexible structure, converting the feedback signal to a desired periodic waveform, and re-exciting the flexible structure with a first actuator driven by the desired periodic waveform.

15. A method for maximizing the vibrational amplitude of a flexible structure according to claim 14, further comprising the step of amplifying the desired periodic waveform.

16. A method for maximizing the vibrational amplitude of a flexible structure according to claim 15, further comprising the step of filtering steady state drift from the feedback signal.

17. A method for maximizing the vibrational amplitude of a flexible structure according to claim 16, further comprising the step of removing high frequency noise from the feedback signal.

18. A method for maximizing the vibrational amplitude of a flexible structure according to claim 17, wherein the desired periodic waveform is a square wave.

19. A method for maximizing the vibrational amplitude of a flexible structure according to claim 18, further comprising the step of providing vibratory input from a second actuator to the flexible structure along an axis different from the oscillatory vibration excited by the first actuator, simultaneous to the step of re-exciting the flexible structure with an actuator driven by the desired periodic waveform.

20. A method for maximizing the vibrational amplitude of a flexible structure according to claim 19, wherein the vibratory input provided by the second actuator to the flexible structure differs in phase and amplitude from the oscillatory vibration excited by the first actuator.

21. A method for maximizing the vibrational amplitude of a flexible structure according to claim 17, further comprising the step of providing vibratory input from a second actuator to the flexible structure along an axis different from the oscillatory vibration excited by the first actuator, simultaneous to the step of re-exciting the flexible structure with an actuator driven by the desired periodic waveform.

22. A method for maximizing the vibrational amplitude of a flexible structure according to claim 21, wherein the vibratory input provided by the second actuator to the flexible structure differs in phase and amplitude from the oscillatory vibration excited by the first actuator.

23. A method for maximizing the vibrational amplitude of a flexible structure according to claim 22, wherein the desired periodic waveform is a square wave.

24. A method for maximizing the vibrational amplitude of a flexible structure according to claim 22, wherein the desired periodic waveform is a sine wave.

25. A method for maximizing the vibrational amplitude of a flexible structure according to claim 22, wherein the desired periodic waveform is a sawtooth.

26. A method for maximizing the vibrational amplitude of a flexible structure according to claim 22, wherein the desired periodic waveform is a ramp.